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Journal of the Society of Arts.

FRIDAY, DECEMBER 13, 1861.

INTERNATIONAL EXHIBITION OF
1862.

The Council beg to announce that the Guarantee Deed is now lying at the Society's House for signature, and they will be much obliged if those gentlemen who have given in their names as Guarantors, as well as others interested in the Exhibition, will make it convenient to call there and attach their signatures to the Document. Signatures for sums amounting in the aggregate to £441,450, have been attached to the Deed.

WEEKLY PROGRESS OF THE INTERNATIONAL EXHIBITION.

The progress made in the erection of the eastern dome this week, is perhaps a little more promising than it has hitherto been. There is now, at any rate, something like shape and form to be discovered. Still the fact cannot be concealed, that the principal part of the task, the raising and fixing of the iron ribs, has yet to be accomplished.

The well-known ability and energy of Messrs. Kelk and Lucas, backed by their almost unlimited resources, are a guarantee of their contract being completed within the specified time, but in justice to those gentlemen it is as well that the public should be made aware that in case of any delay the responsibility of the failure does not rest with them.

The completion of the northern courts, which is part of the sub-contract of the Thames Iron Company, necessarily lingers in consequence of their exertions being concentrated on the dome. Indeed, the rapidity with which the courts on the south side of the nave have been finished, is in startling contrast with the slow progress of the corresponding works on the north. It may be pointed out that the advance of the western dome, which is in the hands of the contractors themselves, has been perhaps as tardy as that of the eastern, but it must be recollected that the execution of this part of the work is necessarily dependent on the supply of iron, which rests with the Thames Iron Company. Now, however, that the whole of the iron has been delivered, a more rapid progress may be expected on the side facing Prince Albert's-road.

All other parts of the building are in a satisfactory condition. The ironwork of the central staircases is being fixed, and the great columns which support the domes are being cased with brickwork to the height of the gallery floor. The glaziers are at work on the large windows

of the corridors underneath the picture galleries, and the carpenters have laid a great part of the flooring. It is understood that the eastern portion of these corridors has been reserved to Great Britain for the exhibition of carriages; it is well adapted for the purpose, both as regards light and space. The refreshment courts and galleries are advancing with great rapidity.

A commencement has been made on the eastern annexe, by raising some of the ribs. This annexe will consist of a series of arcades, similar in construction to the aisles of the machinery shed, surrounding three open courts. It is proposed to occupy this annexe with agricultural implements and raw produce, such as minerals and building stone; the open courts are well adapted for the exhibition of greenhouses and model cottages.

The picture galleries are fast approaching completion. The coving of the southern gallery is finished along one side, and within a day or two the scaffolding will be removed, and a clear view obtained all along the gallery. Outside nearly all the scaffold-poles have been taken down. The water-colour galleries are also being pushed forward, the roofing is fixed throughout, and nearly the whole of the top-lighting glazed. In the south-eastern gallery the walls are in course of being boarded. The upper story, over the central entrance, which it is proposed to devote to the exhibition of photography and educational appliances, is roofed in.

As regards the arrangements for the Exhibition, considerable progress has been made. All the allotments of space (with the exception of four) have been returned from provincial committees, and Her Majesty's Commissioners are actively employed in adjusting them and arranging for the exhibition of trophies and decorations. The nave and transepts are to have three longitudinal passages of seventeen feet wide, thus leaving two spaces seventeen feet each for exhibiting purposes; there is, moreover, to be a grand central transverse passage, fifty feet wide, leading direct from the central entrance-hall to the refreshment courts.

Every exhibitor, within ten days after notice of the space allotted to him has been received, is required to fill up four forms:—

1. An engagement to occupy the space placed at his disposal.

2. A return of three names of persons to serve on the jury of the class in which he proposes to exhibit.

3. The particulars of his name, address, and description of articles he wishes to exhibit.

4. The matter (if any) which he wishes to insert in the Illustrated Catalogue.

The railway companies are actively engaged in considering the arrangements to be made for

organising the traffic to and from the metropolis during the period of the Exhibition.

The following additional arrangements have been made :—

URUGUAY.

The following gentlemen have been appointed Commissioners for this Republic, in addition to Mr. Graham Gilmour, of Glasgow, whose appointment has already been notified:—Alderman Thomas Q. Finnis, of London. and Mr. John Proudfoot, of Glasgow.

PAPAL STATES.

London Commissioner.—Henry Doyle, Esq., 17, Cambridge-terrace, Hyde-park, W.

FOURTH ORDINARY MEETING.

WEDNESDAY, DEC. 11TH, 1861.

The Fourth Ordinary Meeting of the One Hundred and Eighth Session was held on Wednesday, the 11th inst., Sir John Rennie, F.R.S., in the chair.

The following candidates were proposed for election as members of the Society :—

Alcock, Michael	{ The Windsor Bridge Iron Works, Manchester.
Aldred, Geo. Edwd., M.D.	{ 14, St. James's-square, S.W.
Blaker, William Lamport	{ Bellevue, Worthing, Sussex.
Cartwright, H. C.	{ 14, Manchester-square, W.
Cleverty, James John ...	{ 16, Gloucester-place, Hyde-park gardens, W.
Dines, George.....	{ St. Anne's-hill, Wandsworth, S.W.
Evans, Jeremiah.....	{ 33, King William-street, City, E.C.
Gould, Charles Augustus.	{ Winterslow, Vassall - road, Brixton, S.
Hansard, Luke Henry, B.C.L.	{ Westgate House, Arundel, Sussex.
Jones, Wm. Hibbs.....	{ 4 and 5, Jewry-street, Aldgate, E.C.
Lawrence, Henry	{ High-street, Kensington, W.
Lindsay, Thomas	{ Mill-wall Brewery, Mill-wall, E.
Lucas, Charles	{ (Lucas Bros.) Belvedere-road, Lambeth, S.
Marcus, Henry Robert ...	{ 40, Falkener-street, Liverpool.
Messenger, Joseph	{ Spring-gardens, S.W., and Folkestone.
Ridge, Edwin James....	{ 6, Dorchester-place, Regent's-park, N.W.
Routledge, William	{ New Bridge Foundry, Adelphi-street, Salford.
Symonds, Captain, R.N...	{ 10, Adam-st., Adelphi, W.C.
Wragge, Frederick	{ Stoke-on-Trent.

The following candidates were balloted for and duly elected members of the Society :—

Ames, Henry St. Vincent, M.A.....	{ Cote House, Westbury-on-Trym, near Bristol.
Ayerst, Francis	{ 24, Bessborough-gards., S.W.
Benson, William	{ 135, Oxford-street, W.
Blake, Henry Woolaston, F.R.S.	{ 8, Devonshire-place, Marylebone, W.
Brierley, Henry	{ 8, Surrey-st., Strand, W.C.
Buchan, Jno. Hitchcock...	{ The Grove, Hanwell, W.
Cator, Geo. Albemarle ...	{ Selby, Yorkshire.
Carbutt, Geo. Henry.....	{ (C. C. Douglas) Liverpool.
Clark, Alexander	{ Tower-house, Highbury New-park, N., and 15, Gate-st., Lincoln's-inn-fields, W.C.

Cleugh, Alexander	{ Imperial Mills, Bromley, E.
Dadley, John.....	{ Birmingham.
Douglas, Charles C.	{ Dale-street, Liverpool.
Douglas, William	{ High-st., Exchange, Liverpool.
Edwardes, Thos. Dyer ...	{ 5, Hyde-park-gate, Kensington-gore, W.
Ethelston, Rev. Charles	{ Rectory, Uplyme, Devon.
Wicksted, M.A.	{
Goschen, George Joachim	{ Eltham, Kent.
Halse, William	{ 12, Love-lane, Aldermanbury, E.C.
Hampton, Thos. Inglis...	{ 20, King-st., St. James's, S.W.
Harris, Frederick Wm....	{ Coal Exchange, E.C.
Hellman, Christian	{ Club Chamb., Regent-st., S.W.
Hook, John	{ 66, New Bond-street, W.
Jackson, Frederick	{ Nottingham.
Lyle, J. G.	{ 20, Little Moorfields, E.C.
Makin, Edwin John.....	{ Attercliffe, Sheffield.
Martin, Henry	{ Westwood - villa, Highbury New-park, N.
Michael, Michael Henry	{ 20, The Cedars, Putney, S.W.
Oldershaw, Captain R.	{ 74, Warwick-sq., Belgravia, S.W.
Piggott	{
Pickering, John.....	{ 40, Little Moorfields, E.C.
Schwartz, Henry Wm. ...	{ Hamburg.
Sears, Henry Beaufort ...	{ (C. C. Douglas, Liverpool.) (Messrs. Carstairs and Co.), Liverpool
Sharp, Wm.	{ Edward-court, Handsworth, near Birmingham.
Stapleton, Thos. Werney.	{ Marne-cottage, Roehampton, Surrey, S.W.
Stephens, Chas.	{ Earley-court, near Reading
Tidswell, Edward	{ 1, Friday-street, E.C.
Walton, Geo.....	{ 2, Charles-st. Grosvenor-sq. W.
Wertheimer, Sampson ...	{ 154, New Bond-street, W.
Wood, Geo. Watson	{ 24, Gloucester-street, Belgravia South, S.W.

AND AS AN HONORARY CORRESPONDING MEMBER.

Vogt, G. Berne, Switzerland.

The Paper read was—

RAILWAY MANAGEMENT, FROM THE PASSENGER'S POINT OF VIEW.

By T. BAKER, OF THE INNER TEMPLE, BARRISTER-AT-LAW.

At the time of the Exhibition in 1851, the railways having their termini in the metropolis were capable of daily delivering and returning 40,000 passengers; but it has been calculated that the Exhibition of 1862 will find the capabilities of the London railways so extended that, instead of 40,000, upwards of 140,000 people may be carried to and fro every day. It is, then, obvious, even if this carrying power stop at the present point, that the management of railways is an affair of national importance as regards the comfort of the vast number of passengers necessary to make these undertakings pay, and also the yielding a fair security to holders of railway stock.

As the comfort of the passengers must in the main regulate the amount of traffic, it is proposed in this paper chiefly to treat that portion of the subject. It may, indeed, be affirmed that there can be no comfort if the road be not good and the travelling safe; nor can the proprietors expect to secure a fair return for capital and labour, unless the advantages offered be such as to attract custom and afford pleasure. With regard to the condition of railway property, it is well-known that there is scarcely one line which is not worked at a loss, for there are few which divide £5 per cent., and that is but a fair interest for borrowed money without labour or risk; yet the capital invested in British railways already amounts in round numbers to four hundred millions sterling, or nearly half the amount of the National Debt. The mere commercial

success of these immense undertakings is in itself indeed a national question.

One reason why railways do not pay is that great extravagance was displayed in their original construction. This, however, is past remedy.

Another reason why better dividends are not paid is the absurd jealousy which exists, arising from the old stage coach notion that only a given number of persons can possibly desire to travel, and therefore any new contiguous railway must necessarily be a competing line. Hence the great battle of the gauges before Parliamentary Committees, which even now threatens to be renewed in the West. Hence the often studied delay of trains on one line, in order that travellers seeking to go forward on another, having trains apparently to suit the arrival of the first, may be disappointed and left behind,—practices so petty in themselves, that it would be hardly conceivable that men of respectability could resort to them, were it not patent that such things are done,—as if the chief object of the carrier were to disgust the traveller, teaching him to regard a journey as a bore to be avoided, instead of encouraging people to move about. The truth is, that the more numerous and accommodating the lines become, the better will they pay.

Dividends can only be raised to any considerable extent by increased traffic, and that a great increase could be provided for on existing lines with additional rolling stock, is proved by the fact that, on extraordinary occasions, and sometimes by borrowing rolling stock from other companies, the ordinary business is greatly multiplied. Indeed, to add very much to the present every-day traffic could offer no difficulty so far as the mere capabilities of the lines themselves are concerned. This is especially the case in reference to short distances and for regular travellers, and the main reason why it is not so increased is without doubt that the comfort of travellers is not as yet secured.

It is scarcely possible to conceive a limit to the extent of travelling over distances varying from 10 to 50 miles of London, or other of our larger towns, provided the facilities of which railways are capable were afforded to residents in the country having business in cities. At present these facilities are denied. It is not alone that annual fares are too high, and trains not sufficiently numerous; but, what is even of more consequence, people cannot bear the travelling. That which may be pleasant for a time, and ought to be so always, soon becomes a burden under present management, and perhaps ere the first ticket has expired, the passenger's physical strength succumbs before the process of continual violence to which he has been subjected, and the alternative of bodily prostration, or sacrifice of property and the advantage of country life, is presented.

The interest of railway proprietors, therefore, requires that these things should be gravely considered. The shareholders' interest is identical with that of the passengers; and the welfare of the latter cannot but conduce to the welfare of the former. At present, for one who tries and relinquishes the experiment of country residence, perhaps a score are deterred by the recapitulation of his loss and personal suffering; yet there is no valid reason why this should be inflicted. An hour's ride, night and morning, was a pleasure in the good old times when, "having swallowed in the roll, we rolled into the Swallow." Why should a journey of the same duration now, be productive of pain? It surely cannot be unavoidable that rapidity of motion should involve the shaking of the passenger more violently than the physics by which his medical adviser vainly strives to afford relief, so long as such abnormal exercise is continued. One gentleman, known to me, having last year purchased a residence 30 miles from town, has recently sold it, being unable to continue the travelling. A second passenger, on the same line, frequently observes, "Depend on it, I don't go oftener than I can help, for I find I cannot stand it." A third person, who had tried a shorter distance three years, says that nothing should ever induce him to undertake a regular railway journey again. A

fourth informed me that he had incurred considerable pecuniary loss by the experiment, which he had relinquished; these are instances occurring among my own personal acquaintance, but in truth, it is becoming notorious that a daily journey by rail is exceedingly trying to the constitution. Sir Ranald Martin informs me that, persons who have suffered in India from sun-stroke, are generally unable to travel by railway, and that it is a common observation, that constant travelling by railway eventually disturbs the functions of the nervous system and of the circulation, so much so, that men of business who made a habit of morning and evening journeys, have been obliged to give it up. I have also the authority of Dr. Southwood Smith for stating, as a well recognised fact among the medical profession, that delicate persons, and especially pregnant women, are very liable to be injuriously affected by a single journey; and Dr. Smith has, himself, recently known two gentlemen forced to abandon their country residences after little more than a year's experience, to save their health from permanent injury.

It may be thought, by managers of railways, that these evils arise merely from excitement acting on nervous people, but this is evidently a mistake. Men readily become accustomed to any habit which is not physically injurious, and as the novelty wears off excitement subsides. The effects of excitement are shown at first, and diminish by use; but in the case of the railway traveller the mischief is not felt until after a considerable time, the spinal column having in the meanwhile become gradually weakened, and when pain is first felt the evil may have already become deeply seated. My individual experience may afford a fair illustration of the truth of this reasoning. A person of active habits, I have often undergone considerable muscular exertion, both in pedestrian and horse exercise; having, for example, accomplished more than 50 miles on foot without resting; and on several occasions ridden that distance on the same horse in one day. As a specimen of railway experience, I may mention that in October, 1858, I left London for Liverpool, proceeded to Manchester three days after, and returned to town the following day; travelled again to Manchester on the 10th November and back the 11th. To the same place the 21st, returning the 24th; to Leeds on the 8th December, Bradford the 9th, Hull the 10th, London the 11th; on the 13th to Taunton, the 14th to Exeter, returning by same night's mail to town. On the 21st December left for Southampton at 3 p.m., returned by the night mail, and, after an hour and a half's rest, started for Liverpool the 22nd, to Manchester and Stockport the 23rd, and by same night's mail to London. To Bath 7th January, by afternoon express, returning following morning; to Bristol, 31st January, returning same night. None of these journeys produced any apparent effect on me, which may seem to afford tolerable evidence that I might resort to railway travelling with impunity. In the summer of 1860, however, having removed to a residence a little over 30 miles from town, I commenced travelling regularly—six days a week, 64 miles by rail. For the first eight or nine months nothing beyond ordinary fatigue was felt, but suddenly the aggregate result manifested itself in a sense of weariness and pain in the back, at first during each journey, but soon becoming constant. Without discontinuing the daily journey, I have succeeded in overcoming the evil, simply by standing up, availing myself of the springs supplied by nature to correct the vibration supplied by art; thus guarding the spinal column from the violent action of the carriage springs, or rather want of them;* and by resorting to other expedients of a similar kind, which it is evident that persons

* I am informed, by an experienced station master, that drivers and guards, who are necessarily robust men, are much tried by the physical strain upon them, but that guards suffer more than drivers. If this be so, the explanation I think must be, that the former sit, while the latter stand.

fond of ease, or who may not be in robust health, and ladies especially, could not practise. They therefore find themselves compelled either to abjure country air, or to relinquish urban engagements.

The cause of the evil is not the excitement of travelling, but the violent and unceasing jar of the railway carriage as hitherto constructed, combined with unevenness of the rails. Indeed, the question of the best kind of spring to afford ease to the passenger, can scarcely have been considered by the carriage builders, however luxuriously the interior of first-class carriages may appear to be fitted. In the first place, the single horizontal springs in use are manifestly inadequate for the purpose required. So unsuitable are they that it is difficult to conceive how they could have been brought into use, except from the fact that they were employed for carriages on common roads; but the coach was adapted to such road, by every method which could be devised to give ease to the traveller without distressing the horse. The latest of such improvements was the abandonment of the C spring, because by its use the momentum of the carriage was lost, or of little avail in going over stones, and the horizontal, bow, or grasshopper springs, were substituted. Taking for granted that all the latest improvements were to be adopted in the railway carriage, the coach builder seems to have forgotten that there would be no stones to hop over, and, therefore, no objection to the C spring, which is quite as easy for vertical motion, and far more easy for longitudinal and lateral motion, as well as a greater protection in case of violent concussion, than the others.

I am not an engineer, and therefore offer no opinion as to the method by which the desired end may be accomplished, but being in the habit of conversing with numerous fellow sufferers and complainants under the present state of things, and hearing various contrivances discussed, it may be no harm to mention one or two as examples.

It has been suggested that the seats might be detached from the carriage body, placed upon higher and stronger spiral springs than are now used for cushions, and kept steady by guiding rods, the holes through which these pass being surrounded with a thick packing of india-rubber. Another plan is that the carriage, instead of being directly attached to the springs above the wheels, should be so constructed as to hang within an outer frame. Say, for instance, that the sides and top of this outer frame should be a light trellis work of wrought iron or wood, and that at every point of intersection in this trellis work, from the top, ends, and sides (exclusive of the door spaces) springs be attached, after the manner of boiler stays, and connected with the internal frame or carriage proper. As, besides the interior, the doors only of the inner frame would be visible, no further finish would be needed for them. They might be much lighter than the present carriage body, as well as roughly made, and the saving thus effected would go towards paying for the external trellis work and springs. If these springs could be made of india-rubber, or some other non-conductor of sound, another advantage would be gained by lessening the noise which at present is so distracting to nervous people. Whatever may be the value of these suggestions, and perhaps double external springs might do much, it seems plain that it is the interest of railway proprietors to make the habitual use of their roads possible:—whereas it appears, from the Board of Trade returns, that there were fewer season ticket holders by 2,000 in 1860 than in 1859. If these be taken at only £10 each, it would show a loss of £20,000 clear profit in one year, but it should also be remembered that country residents travelling daily to town invariably bring more occasional passengers than any other class of persons, because, besides other members of the family, no town acquaintance can be brought home to dinner without first feeding the railway. It is impossible, therefore, to calculate the real loss sustained by any diminution of the home traffic, and in accordance with self interest, it would be wise to offer a premium for the carriage which shall combine the least possible amount of jar with the least possible degree of noise.

Perhaps all that need be rigid and hard in a railway carriage is the framework on the wheels, on which pillars supporting a rigid roof might be placed. From these roofs, could be suspended, by elastic ropes, light flexible compartments, all the sides and seats of which could be padded and soft, so that in case of ordinary concussion (and a complete smash is the rare exception) passengers, not driven against each other, could scarcely experience a blow harder than might be received from a boxing glove, and thus would be afforded a great preservation from personal injury. These carriages might be more expensive in their original construction than the present coach-carriage, but not materially so; they could not sustain nearly so much damage either from ordinary wear or from collision, and the saving of compensation to injured passengers would be considerable, even were not the comfort of the traveller, or a still more important consideration, the preservation of life, taken into account.

An auxiliary means of affording greater ease with less noise, might be simply to cut the rails in a slanting direction, so that the joints would be oblique instead of square, which would go a great way towards diminishing the continual jar at the points of junction. The amount of depression at the joints may also be decreased, and the process of fishing, as it is termed, superseded,—and therefore the cost of fixing the rails lessened, whilst much of the expense of relaying might be saved,—by substituting for the wrought-iron bars on chairs at present in use, strong longitudinal beds of cast-iron, having grooves into which light wrought-iron bars with steel surfaces might be inserted, so that the more expensive tough metal required to take the wear may be easily replaced in the grooves. The cast-iron beds, having no friction, would last a very long time if protected, as they easily might be, from oxidation.

The improvements which have been pointed out being requisite for first class carriages, how much more must they be for second and third class? The same substantial comfort would, I conceive, be provided for all under judicious management, for granting that luxurious exclusiveness should pay an additional fare, it can be none the less true that it is the attraction of numbers, rather than of the wealthy few, which must be aimed at if traffic is to be largely increased so as to make railways pay. What is wanted is, greater facility as regards personal comfort, reasonable speed, and frequent trains, in order to induce a multitude of travellers habitually to use the road. If the conditions of cleanliness and decent behaviour were enforced, as they ought, it would appear unnecessary to employ third class carriages at all. Surely to incur the extra expense of running separate third class trains because the passengers pay less, is something like "cutting one's nose to spite one's face."

In winter much suffering from cold might be avoided by turning the spare steam not wanted for blast, into tubes fixed along the floors of the carriages, which might be rapidly connected from one carriage to another by means of flexible joints; and since the draft of this paper was written, I have been pleased to hear that the system of warming the carriages has been introduced on the London and North-Western Railway, as it had previously been on the continent.

The carriages should be high enough for tall men to stand up with their hats on, and they should be well ventilated at the top, so that the windows may be shut, whenever desired, to exclude cold or dust. Dust in summer is not only a nuisance to passengers but a great expense to companies, damaging the carriage linings, the bearings of the wheels, and most important of all, the engine, but it might be almost entirely prevented by laying gas tar asphalt throughout the line, and this would further save waste to the permanent way both in wet weather and dry.

A very great source of annoyance to travellers in general is experienced from tobacco fumes, produced by the few whose conduct is governed by sensual appetite. They

not only render their companions uncomfortable, but leave the sickening odour for future occupants of the carriage. Even to ask a fellow traveller whether he objects to be smoked upon, is in my opinion, a piece of ill-breeding. The very question forces upon him at least the probability of annoyance. He may endure that which is disagreeable, and by his consent become accessory to the annoyance of those who may come after (for stale smoke is even more annoying than fresh), as well as to the unfairness of injuring the company's property; or by expressing dissent, he may do that which appears ill-natured towards the individual who asks permission. It is obvious that either alternative might be exceedingly distasteful to a well-bred person. For the protection of the shareholder's property, to say nothing of their customers, the directors of all companies ought either to put down this practice with a strong hand, or provide special accommodation for smokers, as is done on some lines. One compartment of each carriage, lettered "Smoke," would answer the purpose. If companies have not the power to make a stringent by-law, they should obtain it from Parliament. The infliction of a pecuniary fine is not sufficient. The rule should be, that any one found smoking in an ordinary carriage be summarily ejected, and left to await the next train. The guard who allows a smoked carriage to leave the last station for taking up passengers, without a report to the inspector of such ejection should be dismissed. The tickets being collected at that station, would give the opportunity to test every compartment, and if, on the discovery of smoke, there be several persons who deny all knowledge of the offence, each one should be *ipso facto* deemed an offender, and turned out accordingly. Between the last station and the terminus, should smoking take place, it might be detected by the train being occasionally stopped, without notice, to catch culprits, as there is nothing like summary justice in these cases. Under such rules there would soon be an end of smoking on railways.

The chief condition of comfort, after all, is safety; therefore it behoves railway managers to inspire confidence by every means in their power. The two fearful accidents which have occurred during this year have been somewhat alarming, and the majority of all accidents tend to prove that irregularity in the traffic is productive of danger. Although the method of telegraphic communication recently recommended by Captain Tyler may do much, yet perfect regularity ought to be the aim of every line. Hence there should be no extraordinary excursions.

With regard to the method so ably advocated by Mr. Wrigley, of keeping on the danger signal perpetually, so that no train might pass without leave, there has been much controversy, and the presumed loss of time has as yet been successfully pleaded against its adoption, because it is said, to stop the train, steam must be shut off before the signal is sighted; but it may be doubted whether there be any ground for this presumption. At any rate, the loss would not be so great as is perhaps anticipated, considering the increase of power gained every moment whilst the steam is shut off.

A strong light is a desideratum in preventing accidents at night. For this purpose, I am told that if a lens were placed in the door of the locomotive smoke box, just beneath the chimney, and protected from the heat by a sheet of mica, a far more conspicuous light would be obtained without cost than from any lamp yet used. Even tinned iron reflectors from the bottom of the fire box would throw a stronger light than any lamp. At the stations, coloured lights are now used, denoting safety, caution, and danger, but in a mist these can hardly be distinguished, whereas were one, two, or three lights substituted—the gas for which might be turned up and down by the signal arm itself—much greater security would result. In addition to this, turning up the whole of the station lights as soon as the whistle is heard* might be made an "all right" signal, to be turned down again as soon as the train is passed.

* A speaking trumpet directed before the whistle would convey the sound three times as far.

Communication between the guard and driver has at length been accomplished on many lines, after much public clamour, but it might have been effected by a more simple plan. The experiment was once made by a sub-engineer, of placing a mirror, in view of the driver, at an angle, in front of each side of the engine, so that the whole of the two sides of the train were shown at a glance. The result is said to have been that an object thrust out of any window caught the driver's eye, without his turning the slightest attention from his look-out ahead. It was impossible to avoid seeing it, so that in case of danger—fire especially—a number of hands or handkerchiefs shown from any carriage, would afford a most satisfactory signal. Unfortunately, the chief engineer was somewhere on the line when the experiment was made, and immediately ordered an innovation introduced without his authority to be suppressed, and nothing more has been heard of the signal mirror; which, by the way, might probably also serve for light reflectors for the back of the train at night.

Notwithstanding all that can be said about accidents, it must be admitted that railway traffic has hitherto been carried on with wonderful security to life. Thus in 1860, out of 163,435,678 passengers (47,894 of whom were season ticket holders, reckoned as one each), 30 only lost their lives from causes beyond their own control, (20 of these deaths were from two collisions), and 479 were injured; which is in the proportion of 18 per 100 millions, or 1 in 5½ millions passengers killed, and not quite 3 per 10 millions, or one in about 350,000 wounded. Yet this was a high rate, the average killed for a number of years being about one in eight millions.

The Returns of the Registrar-General show that the deaths by violence of all kinds average about one in 1,250 per annum. Of course it would be incorrect to compare the risk of those exposed to danger for a short period with those so exposed during the entire year, but by a return with which I have been kindly furnished from the South Western Railway, it appears that in 1860 the average payment of all passengers on that line was 1s. 9d., which would pay for a journey occupying about 40 minutes, or the 13,000th part of a year. Now as one in 5½ millions of all railway passengers were killed in that year, it follows that supposing persons travelled without intermission day and night, the death rate would be 1 in 420 per annum. In other words—according to the doctrine of chances, a person must thus travel incessantly for 420 years before his turn to be killed will arrive. The ordinary death-rate of the country by violence, as has been stated, is 1 in 1,250; but as people are scarcely exposed to danger when quietly at home, or, in general, when sleeping, it would be fair to take the common exposure at eight hours a day. The average risk, then, by violent deaths, among all classes of the community, is about the same as among railway passengers in proportion to the duration of their exposure. Calculated according to the same method (taking the risk at forty hours per week), the proportion of fatal accidents in collieries is seven times greater than in railways; yet casualties in mines are seldom heard of except in such cases as Lund Hill and Risca. So, also, the deaths by burning (chiefly among infants) are one hundred times more numerous than by railways (it is difficult to estimate the period of risk, without which the proportion cannot be calculated), but it is only when actresses or noblemen's daughters are the victims that such horrors ring through the country. In like manner, volunteers and sportsmen are now and then accidentally shot; skaters are drowned; and sometimes persons are suffocated in their beds by poisonous vapours, or even crushed under falling buildings; but nobody thinks of allying his calling, his recreation, or his rest, because in every situation of life the risk of accident impends. Indeed, it would be almost as wise to refuse to live for fear of death by violence of some kind, as to abjure the use of railways for fear of a fatal result. The relative propor-

tion of persons injured on railways, as compared with those by other accidents of some kind, serious or trifling, cannot be guessed at, but we may take for granted that every scratch is made the most of.

Railway managers should have their due, as well as other offenders, whereas, in regard to compensation for accidents, they have been very hardly used. It appears monstrous that a sum of £13,000 could have been awarded to be given by a company to the family of one man, who had paid no higher fare than his fellow-passengers, because he happened to be wealthy. For that very reason, if he desired to insure a large compensation in case of death, he should pay a premium proportionate to such assurance. There is no justice, but clearly the contrary, in compelling shareholders to suffer for the accident of conveying a man of wealth, which the company could have no means of knowing or guarding against. If this state of things be not altered, companies must, in self-defence, either make a sliding scale of charges in proportion to the passenger's property, attested by declaration on the ticket issued, or decline altogether to carry wealthy men. Let the companies pay, by all means, but let the amount they pay bear some fair proportion to that they receive.

A system of insurance might be organized, the company being bound to deliver the passenger safely at a fixed rate, or pay a fixed amount as compensation, and to take insurance at a reasonable charge, for extra sums say one farthing per £1,000 which is $5\frac{1}{2}$ times the risk; as it has been seen that fatal accidents to passengers, under proper management, do not amount to one in $5\frac{1}{2}$ millions.

If irregular excursions be discontinued, as they ought, it must be by making all regular trains practically excursions. The fares should be so low as to be a standing inducement to pleasure seekers to use the road at every opportunity that may offer, not only during seasons of recreation, but whenever temporary cessation of business might allow. Excursion fares have hitherto been lower than necessary for this purpose; nevertheless, even these pay, as is proved by their being continued notwithstanding the disadvantage of extra expense in advertising, additional labour, &c. The mean to be aimed at should probably be something between the present excursion and ordinary third-class fares, the proportion being greater for short distances, and less as the mileage increases. One can now go to Brighton and back, on Sunday, 100 miles, for 2s. 6d.; but suppose the opportunity were offered by every train during the week of taking the same journey for 5s., nobody having inclination and time to spare, would be deterred from going by the expense, and the cost of the extra excursion trains would be saved. The great body of the people never cease to seek recreation of some kind; sensual pleasures are at present most easily procured; nevertheless, were it within reach, travelling to see the country, or to visit distant friends, is even more seductive, and would be readily resorted to on all occasions were the temptation always present, and the change would tend very much not only to the elevation of public morality, but to the improvement of railway dividends. On such a plan not pleasure-seekers alone, but business men of every kind, would oftener visit distant marts, travelling also between provincial towns and villages, as well as to and from important centres; and trains being naturally more frequent, greater facilities would be offered to suburban residents.

At present horses on some common roads can beat rail and steam. This is proved by the fact that numerous loaded vans are, during the summer, daily driven from Bristol to the little watering places of Clevedon and Weston (distances of 14 and 20 miles), filled with excursionists, because the fares on the Bristol and Exeter Railway, which goes to both towns, are from sixpence to a shilling higher than the rates charged by these horse vans. Is it not strange that shrewd men should be able to invest capital in vans and horses for the purpose of carrying mere pleasure-seekers along the very line of railway and make it

pay? It is evident that if this can be accomplished in one locality, it could in the neighbourhood of almost any line as at present conducted.

Considering the fact that the expenses of getting up steam and working a train are nearly the same whether the carriages be many or few, whether they be full or empty, and therefore that every additional sixpence received is almost all clear gain, it is remarkable that in this practical age the immense resources at the command of railway companies, from a profitable use of the land in their possession hitherto lying idle, can have so long been unperceived. Incalculable losses have been incurred by the construction of branch lines to unimportant towns, without any effort being made to obtain an increased population either in these towns and villages, or along the lines themselves. Hundreds of acres belonging to the companies have been turned into mere waste, which, converted into building ground, might have been, and might yet be, rendered highly profitable. Granting that there may be companies unwilling, or who have no power to build houses for tenants merely as such, there is, at any rate nothing to prevent them from providing cottages for their own servants, who might occupy these houses as part of their wages, and the men might be conveyed by early and late luggage trains to and from the stations at which their services are required, with scarcely any expense to the company. The effect would be that every servant would derive a benefit much greater than the difference of wage, which would be saved to the management. They would breathe pure air, and be enabled to purchase country produce, each of great value in the maintenance of health, and the provision for their families, whilst the shareholders might get a large per centage on the building capital by the consequent deduction from salaries in lieu of rent.

Irrespective of peopling the companies' own land, the increase of population in the neighbourhood of each station ought to be assiduously encouraged. This might be done by the judicious application of the annual ticket system. The citizen is carried three miles in an omnibus for sixpence. The railway might carry him 30 for the same money, within the same time. Is there any doubt which tens of thousands of sensible men would choose, provided that easy carriages were contrived and brought into use, and numerous trains to give choice of time provided? When it is considered, moreover, that according to the same proportion he might go ten miles for two pence, or five for a penny, can any limit be imagined to the number of country-living townsmen that might be produced? At present, the ticket almost equals a second rent, and when taken the labour of using it is so great that an escape from the journey is regarded as a holiday, and the experiment is often not renewed.

Annual tickets for ladies and children might be even more remunerative, in proportion, if charged at about a fourth or sixth of the rate of those for gentlemen, because they would probably not be used more than one-tenth as often on the average;—nevertheless, they are indispensable to the full development of home-passenger traffic.

The time occupied at the end of a journey by taking the tickets is a matter of frequent complaint with travellers to whom a few minutes is often of much importance, and it is sometimes remarked, that were the system adopted on the American railways, and indeed on some of the Manchester lines, of taking, and even selling tickets by the guard during the journey, time would be gained, and the staff of the station clerks might be sensibly reduced.

There are many matters of detail well worthy the attention of directors desirous of promoting the comfort and convenience of passengers, with a view to the companies' interests. The care of luggage is a source of anxiety from which many would gladly be relieved. The company might easily take charge of it for a fee of 2d. per package, a receipt for which, being handed to the

passenger, the luggage might be delivered at its address in exchange for such receipt, and this might yield a considerable revenue to the company. The charge of 2d. for merely keeping a package, coat, or umbrella, is extortionate, and defeats its object.

Again, the building of comfortable hotels at leading stations and places of public resort,—let at nominal rents, on condition that the tariff of charges be reasonable,—would do much to encourage pleasure trips; for the present exorbitant scale of hotel charges often prohibits travelling. These establishments, however, should be of moderate size, as when building is overdone, all other expenses being increased in proportion, failure must result, which tends to repress experiments in the same direction elsewhere.

It may be thought hopeless to expect any great reform in railway management without a considerable alteration in the composition of Boards of Directors, who are too often chosen apparently for no other reason than that their manifold engagements of a public or private nature (e.g. as Members of Parliament or heads of large mercantile establishments) must of necessity prevent their giving any real attention to the Companies' concerns, which must therefore be almost entirely left to traffic-managers, engineers, and secretaries. Surely three or five respectable men of business, with an efficient working staff, would conduct the traffic to much better purpose. They should devote their whole time and be well paid for their services, subject—in common with the leading men of the staff—to fines, limited to one-third of their salaries, for all compensations for accidents; so as to render them personally and pecuniarily responsible. At all events I think it must be concluded that any substantial improvement in railway property must be looked for from more responsible management; from diminished traffic expenses, and wear and tear; from legislative justice between the proprietor and the passenger; from reasonable, without unreasonably cheap, fares; and—the essential point—from security of comfort to the traveller; which may encourage a large increase in pleasure-seeking, as well as business journeys, and also in regular home traffic for residents within many considerable *radii* of every large town.

DISCUSSION.

Mr. CARTER was impressed with the belief that if every train consisted of first, second, and third-class carriages, with an interval of not less than half an hour between each train, there would be more security, and the public would be better accommodated. If a man submitted to travelling on a hard seat for the sake of a low rate of fare, he saw no reason why he should not be carried at the same speed as those who paid for the comfort of sitting on a well-stuffed cushion. He thought third-class carriages ought to be attached to every train.

The Hon. OCTAVIUS DUNCOMBE (responding to the invitation of the chairman) hoped he might be allowed to say, as a railway director, that he must not be expected to give his opinion in favour of the sentiments he had heard that evening. With a great deal that was stated in the paper he cordially concurred, but with much he most materially differed. Railway directors, he thought, had not a great many friends. He had the honour of being a director of what he might, without any particular pride, say was one of the best managed lines in the kingdom—the Great Northern; he, nevertheless, had frequent complaints from his friends on all sides, not only as to the punctuality with which the trains arrived at their destination, but also as to the times at which the trains started, and he invariably said to them: “You, as part of the public, will never be satisfied till the trains start at your own hours, carry you at your own speed, and carry you for nothing.” He was quite sure that, although railway directors frequently deserved censure, yet, in his opinion, they did not receive, on the part of Parliament and the public, that

measure of support to which they were justly entitled. Mr. Baker had alluded to the case which happened on the Great Northern Railway, in which it was decided that the Company should pay £13,000 as compensation for the death of a single individual. Now, if these decisions were to be held good, he was certain that railway proprietors must not look for large dividends; for if a wealthy man, paying no higher fare than a poor man, happened to lose his life on a railway, was it just that his family should receive an amount of compensation in proportion to his wealth? He was sure the law, as administered under Lord Campbell's Act, required some revision at the hands of Parliament.

After a few words from Mr. VARLEY,

Mr. BARNETT BLAKE said two or three conclusions had been advanced in the paper which he thought the meeting generally would not agree with. As to the practice of smoking, it should be borne in mind that those who indulged in that habit contributed a large amount to the annual revenue of the country, and in railway travelling it was easy to get rid of the nuisance by setting apart a carriage for smokers. With reference to excursion trains, he believed it would be almost impossible to reduce the ordinary rates of fares to those which were adopted for excursions, and if these trains were abolished, much real benefit to the public would be lost. When they could come from the north of England and return for 10s. by an excursion train, he saw no reason why it should be done away with. He thought the primary error in railway management was this, that directors commenced their duties under the impression that as commercial men they were holding in their charge the property of those who were shareholders, and their whole object was to secure good dividends for them, whereas, if they considered themselves as trustees on the part of the public, to secure as far as possible the safety and comfort of the travelling community, the profits would follow more surely than they did under the present system. A gentleman who had just spoken had referred to the Great Northern as one of the best managed lines in the kingdom. He (Mr. Blake) did not suppose that either the directors of that line, or those whom they employed, would descend to any trickery; yet they did not hesitate to carry persons many miles out of their way to prevent them going by another company's line. [Mr. Blake, with considerable humour, gave numerous instances of the inconvenience suffered by himself and others, owing to the rivalry of railway companies.] Those were cases in which the competition of companies was carried to such an extent as to disgust the public. The real secret of success in railway management would be to establish a Government supervision to prevent the public being made a market of. Mr. Blake went on to point out instances of railways which, having adopted the lowest fares and afforded the greatest amount of accommodation to the public, became highly remunerative lines. He also referred to the inconvenience to which the public were subjected owing to the want of proper regulations for the interchange of traffic between various companies, which resulted in a great deal of annoyance and the loss of much valuable time.

Dr. ELLIS thought the fundamental error in the present system of railway management consisted in directors undertaking a multiplicity of occupations, in most of which they had had no previous experience. How could a man be at the same time an engineer, a builder of locomotives, a coal merchant, a coke burner, and a clothier, with all the other various branches of trade involved in the construction and working of a railway? It was not to be expected that any body of men of the class from which railway directors were generally selected, could possess all the varied qualifications which he considered were necessary for successful railway management—the success being measured by the amount of profits they secured to the owners of the line. He submitted that the functions of a railway board of direction ceased as soon as they had constructed a line from

one point to another, and that, after that, the providing of locomotives and rolling stock, and the conducting of the traffic, should be transferred to the hands of other persons, who had had previous experience in such matters.

Mr. P. H. HOLLAND thought the system recommended by the last speaker would not tend to diminish the risk or to improve the comfort of railway travelling. They might imagine the state of things which would exist from the traffic being conducted by a number of contractors who were to start trains at their own hours, and run them at their own speed. Under such a system the casualties of travelling might be reckoned at 1 in 500 instead of 1 in 5,000,000. The great error of the present management consisted in persons undertaking the office of directors without being remunerated in a way which would induce them to give up their time and attention to the duties they undertook. Having travelled a great deal on railways, he could fully substantiate the statements of Mr. Blake with regard to the annoyances and delays occasioned by the rivalry which at present exists between competing companies for the traffic of various districts. Neither company gained any benefit to itself, whilst the public were exposed to all the annoyances arising from such a system. He submitted that an easy remedy was at hand. They were told that the cost of locomotive power was 1s. per mile per train. That was the rate of expense on the Brighton line, and might be taken as a fair average; how easy then it would be to increase the number of trains, because at such a rate there was no pretence for saying companies could not afford to do so. At the present time, passengers paid a higher fare for the sake of being conveyed from one large town to another at a quicker speed, without stopping at small intermediate stations; but, looking at the infrequency of these fast trains, much of the benefit was lost, as one might have to wait a couple of hours before an express train started, and therefore a saving of time would be gained by travelling by an ordinary train, although it was half-an-hour longer in performing the journey. He did not hold with the doctrine that railway directors were trustees solely for the public accommodation, but he considered they best discharged their duties to the shareholders, as a commercial body, by consulting as far as possible the interests of the public, who were their customers, and that this was the only way of making good profits for the shareholders.

Mr. RICHARD TILL said, after the remarks which they had heard that evening, a man must be bold to avow himself a railway director. That was, however, his position. The discussion had not been of the practical nature he had expected, but had turned rather upon local interests and individual disappointments in reaching particular places, showing how easily, if only the speakers were directors, things could be managed, and that, instead of all the inconveniences spoken of at the points of junction of competing lines, people should be carried direct, without hesitation or delay. They had been told that gentlemen who undertook the functions of directors were unfit for them, because they had other duties to perform, were not specially educated for this work, and were therefore obliged to employ persons conversant with the various minutiae of the undertaking. He thought that, according to such a doctrine as that, the great manufacturing and trading interests of this country would be set at naught. Who was it who undertook, with credit to themselves and profit to the shareholders, the direction of companies engaged in large nautical operations? Who but the merchants—commercial men—not brought up to the sea; men who had learnt their trade not on shipboard, but in the general marts of commerce; who were associated with practical men who acted under them, and advised with them. What would the Peninsular and Oriental Company have been if it had been governed entirely by naval men, instead of by commercial men? It was so with railways, and so far from heaping calumny upon directors, he considered the management of so mighty an undertaking as the railway

system of this country, which carried so large a number of people, with so trifling an amount of casualty and loss of life, reflected upon them the greatest honour and credit. To say that there was any great undertaking in this country that some one could not carp at would be absurd. It was in the common course of things, that nothing could be done perfectly, and however well a thing was done, some one would be sure to imagine it could be done better. They were indebted to Mr. Baker for many excellent hints. He joined in the surprise that had been expressed that improvements had not been introduced in the construction of carriages, which would afford greater accommodation to the passengers. He considered railway directors were placed very much in the same position as tradesmen and shopkeepers. It was their business to encourage customers, and to give them every possible facility and accommodation. Anything which tended to that would tend to the prosperity of the undertaking. He wished Mr. Baker would offer himself to any of the railway companies—not in a Society like this to pass unchallenged. They were told that continuous railway travelling was essentially injurious to health, and that persons who had been in the habit of travelling daily had been obliged to give up their country residences and come back to town, and the name of an eminent physician (Dr. Southwood Smith) had been mentioned as one who endorsed this doctrine, but Mr. Baker did not tell them that that gentleman lived close to a railway, and went backwards and forwards on it almost every day of his life, and he believed had done so for some years past, without appearing to suffer from so doing. But this was not a question to be put upon individual cases. No doubt, in certain states of health, and to certain temperaments, constant railway travelling, like many other things, might be injurious, but the question was, whether railway travelling in moderation, and within certain limits, was injurious? He believed the practical result of millions of persons travelling every day was the best answer that could be given, and was more satisfactory in itself than the statement of any individual person. Then, another important principle was involved in the remarks made on accidents. In the first place they were told that trains at short intervals were a great source of accident, and a little further on they were advised to increase the number of trains. Which statement was to be relied upon? He believed it was not the short interval between the trains which was the cause of accidents; he thought if they had trains every five minutes throughout the day, with an adequate staff, there would be fewer accidents than if the trains were less frequent, because the more closely the *employés* were kept to their work the better it would be attended to; but if a man was called upon to do a certain duty once in every two or three hours, accidents were more likely to occur at those long intervals than if the trains passed more frequently over the lines. Then another principle had been enunciated on the question of compensation for accidents. He contended that the verdict for £13,000, in the case of the Great Northern Company, was a correct and honest verdict. He was prepared to say that if a railway company, through gross negligence of its servants, through

want of proper care as to the state of the rolling stock, or through any of those casualties which, by ordinary attention, could be prevented, brought about an accident, and if a family were, through that accident, deprived of the means of support, that family had a fair right to go to the company and ask for compensation. But if the accident arose from those unavoidable causes to which all undertakings were subject, and if the railway company proved that there was no carelessness or want of caution on their part, he did not believe any jury would give a verdict against the company—nor would they, under such circumstances, be legally liable for damages. It was, in his opinion, taking a wrong estimate of railway management, from a traveller's point of view, to say that the loss of a family was not to be estimated by that of which they had been deprived. Passing to another subject, it was suggested that all trains should be excursion trains, and that the fares should be brought down to that level. He thought that suggestion arose from a want of knowledge of what an excursion train was. Mr. Baker had suggested a standing fare of five shillings to and from Brighton as a medium rate. Now, what was an excursion train? It was put on at a time when the great manufacturing and labouring classes could spare time for the holiday—when the poorest but most industrious part of the population could take a day's amusement. Therefore, to double the fare in order to give advantages to another class of passengers, would be to deprive the working man of one of the most important public benefits of railways, and to injure a class of the community which was now greatly benefited by the excursion traffic. Another gentleman had suggested that a Government Board of Management should be appointed. He thought that, in the present advanced state of public intelligence, and before such an audience, no man would be bold enough to advocate that any of the great public undertakings should be handed over to the management of the Government. Was there ever any Government Board, or did any such body exist at the present day, in which economy was a ruling principle, and by which the greatest amount of convenience was given for the smallest expenditure? He contended that no general Board could surpass the present management of our great public companies, and of the great lines of railway in this country. They were likewise told that railway directors could not do their duty because they were not clothiers, and at the same time practically acquainted with the construction of railway rolling stock. Did any one doubt that the Duke of Wellington was a great general because he knew nothing about the cloth of which the uniform of his soldiers was made? Would anyone say he was unfit to direct an army, or to manage a commissariat because he knew practically nothing about forage or clothing? He knew how they were obtained, and employed proper persons to obtain them, but it was another thing to say he understood the quality of the leather and the cloth that were used in the equipment of his men. It might, perhaps, be true that he had that gift which few men have, of being able to grapple with a vast amount of details whilst he kept the command of his army, but to say that the managing board of a company was unfit for its duty because individual members were not acquainted with the details of every article which the company used in its business, was an absurdity in itself. Directors were appointed to select the best working staff they could obtain to manage the details of the business, and their duty was to see that those details were carried out with economy and efficiency, so as to produce the greatest amount of benefit to the public and to those who had entrusted the management to their hands.

Mr. REYNOLDS, in allusion to the two frightful accidents that had taken place this year, expressed his surprise that the simple practical suggestion which was made at the time, of placing between the carriages and the engine a break van filled with faggots or some other resisting substance, had not been generally adopted. He would strongly

urge some such plan as that upon the attention of directors, as a means of mitigating the consequences of a collision of trains.

Mr. ALEX. BEATTIE said, he and other railway directors present were much indebted to Mr. Hawes for the observations he had made. They had unfortunately been pretty well attacked for their deficiencies, and he also felt much indebted to Mr. Baker for some of the remarks he had made; but he could not believe he was right in assuming that railway travelling was injurious to health, inasmuch as for the last fifteen years he (Mr. Beattie) had been in the habit of travelling two hundred or three hundred miles per week, and he was not conscious that during that period he had suffered from it. Persons who suffered from sun-stroke in India would probably be unequal to a railway journey daily, but he thought those instances ought not to be taken as examples of the effect of railway travelling upon the public in general, and he thought the increasing traffic was sufficient to satisfy Mr. Baker that there was no reason to apprehend that, generally speaking, railway travelling was injurious to health. With regard to the issue of tickets, Mr. Baker had suggested that they should adopt the American practice in that respect. If there were any improvements to be derived from America, he was sure directors would be happy to adopt them as far as possible; but for his part he thought there was nothing in railway management more injurious than allowing the guards to collect the fares. It was found to be attended with so much moral injury to a high class of servants that the practice had been discontinued on one of the lines in Canada. The mode in which the American conductors moved about the carriages would not be acceptable in this country, and was impracticable with the present division of carriages into compartments. They might adopt the French or German system, where the guards travelled along a platform to collect the fares; but in this country the rate of speed was too great to render this a safe operation. A great deal had been said as to the inconvenience occasioned to the public by the delays at the junctions of competing lines. The public ought to be a little more reasonable than to suppose that the trains could be made to fit in with the exactitude which some people expected. Directors were most anxious to give all the facilities in their power, and he thought if the legislature had been a little more careful in the mode in which they granted powers for the construction of railways, the directors would not at the present time have been prevented from reducing their fares, which was rendered impossible by the competition which had been sanctioned. The railway with which he was connected (the South-Eastern) was now suffering from an act of the legislature in permitting another company to run into the very territory they occupied, at a time when there was not a sufficient development of traffic to enable them to pay a fair dividend to each company. He would therefore ask for a little more charity towards railway directors than had been displayed that evening.

Mr. TEULON, in reference to the question of cheap fares, adverted to the case of the Greenwich and Croydon lines, showing that when the latter company raised their fares, in order to cover the toll which they paid to the Greenwich company, they lost a great portion of their traffic—so much so that they actually considered the advisability of shutting up the line, but the shareholders insisted upon resorting to the alternative of reducing the fares to 6d. less than was originally charged as the fare to Croydon, the result of which was that they had an amply remunerative traffic. With reference to the suggestion that the ordinary traffic should be conducted upon the principle of excursion traffic, he would remark that excursion trains were appointed for particular days, and immense numbers of people availed themselves of the reduced fares, but that would be impossible as an every-day occurrence. It was impossible to run frequent trains at low fares unless there were people to fill them. The great reason why the French railways paid so much

better than the English was, that they ran less frequent trains and worked at much less speed, the result of which was that their trains were better filled, and they did not carry a number of empty carriages backwards and forwards. With regard to the subject of compensation for accidents, it was quite true that, as the law now stood, if an accident was proved to have been occasioned by causes beyond the control of the company, they were exonerated, but they must know that the determination of that point depended entirely upon scientific evidence, which was unfortunately purchaseable, and he thought it would be well if the Board of Trade appointed a disinterested person as assessor in the matter of scientific evidence, as to the causes of accident. He agreed with Mr. Hawes, that the responsibilities of railway companies should not be lessened, but at the same time he thought they ought not to be unduly mulcted in cases where the parties paid no higher rate than other passengers. On the subject of rolling stock, and the comfort afforded to passengers, he would remark, that the easiest travelling carriages were those which were of the heaviest build. The carriage in which Her Majesty travelled weighed upwards of five tons, and one could write or do anything else in that carriage without inconvenience.

Mr. BAKER, in replying upon the discussion, thanked the meeting for the kind manner in which his paper had been received. With reference to the last observation of the last speaker, he would remark that, perhaps the carriages required better springs, as he considered those at present in use were too strong for the weight of the carriages put on them, and that was the cause of their being so very shaky. With regard to fares it must be matter of experiment how far they could be reduced so as to be remunerative. His position was that a great deal might be done in making regular trains practically excursion trains, although they could not expect such enormous trains as were required, after extensive notices had been given to the public. If railway management was so efficient at the present time why did not that property pay the shareholders a better dividend? He had stated that he thought trains should be frequent, and he believed under proper regulations frequent trains could travel with safety. As to the illustration of the Duke of Wellington, brought forward by Mr. Hawes, he would say he apprehended it was not the business of the Duke to make the army of the Peninsula pay, but to make them fight, therefore he did not see the logic of that answer in reply to his observations on the subject.

The CHAIRMAN said they had heard Mr. Baker's paper on a subject of great public interest; they had also heard what had been advanced on the part of the railways, and there could be no doubt that the public were immensely indebted to the invention of railways, from which they received a large degree of accommodation with the least possible amount of risk. They had therefore every reason to be grateful to railway companies; but that railway management was perfect, no one would venture to assert, and the nearer they approached to perfection the greater would be the demands upon them. It was manifestly to the interest of the companies to give the public the utmost amount of accommodation in their power. They were very heavily taxed, and it was to their interest to do all they could to accommodate the public, and there could be no doubt the public were conveyed in a way they never were before. Every year the accommodation was increased. Railway companies were beginning to understand better the multifarious details which were involved in the management, and every year the accommodation was made more perfect, and, as a consequence of the accommodation being more perfect, the demands upon the companies became more severe; therefore they were taxed to give on the one hand greater speed, and on the other hand to give a greater number of trains. Looking to the amount of profits earned by these undertakings, taking them in their aggregate, they did not amount to more than

3 per cent., which was the rate of interest which could be obtained from Government securities, without risk of the fluctuations of trade; therefore they must see it was to the interest of the companies to do all they could to accommodate the public. He was one of those who thought the responsibilities of the companies should not be lessened; but at the same time they ought to give them every encouragement. He quite agreed that the carriages might be improved, and better warmed and ventilated than they were at present. He had travelled on the American lines, and he confessed there were many things there which he should be sorry to see introduced into this country, and he was sure the same feeling would be entertained by the majority of the public, though it was true that on the American railways the carriages were better warmed, particularly those on the Grand Trunk of Canada. He had also seen on the American lines, sleeping carriages, in which passengers could travel all night in the most luxurious manner. These were matters of detail, which he believed would be ultimately arrived at by the companies in this country. He was sure the meeting felt obliged to Mr. Baker for bringing forward his views on the subject, and he believed some of the hints thrown out would not be lost upon the railway companies, and if they could be persuaded to lay aside an undue spirit of rivalry with each other, their business would be greatly increased, and the public would be better served. He concluded by moving a vote of thanks to Mr. Baker.

The vote of thanks having been passed,

The Secretary announced that on Wednesday evening next, the 18th instant, a paper by Mr. F. Grace Calvert, F.R.S. "On the Improvements and Progress in Dyeing and Calico printing since 1861," would be read.

Home Correspondence.

THE BUILDING FOR THE INTERNATIONAL EXHIBITION.

SIR,—Will you allow me to correct an error which occurs in your report of the few observations which I made at the meeting of the Society of Arts, on Wednesday, the 4th instant? I am made to say that Captain Phillpotts had stated that "certain ignorant persons had represented to the public that the domes, which were considered the most beautiful features of the building, were not to be seen from the south front." What I really stated was in accordance with the Captain's observations, namely, that "certain ignorant persons had represented the building as if the domes could be seen from the south front."

I am, &c.,

HENRY OTTLEY.

13, John-street, Adelphi, Dec 12.

STEERING OF STEAMERS.

SIR,—Without discussing the whole of Mr. Leigh's propositions, I should like to inform your readers that the plan for steering paddle vessels by the separate action of the wheels has been in use, to my own knowledge, in the boats on the Mississippi river for more than six years, and probably for a much longer period. It is, therefore, practicable for river steamers; whether it is so for sea-going vessels is a point I think yet to be determined; it certainly is not without some efficient means of governing the engines more than those in general use.

With regard to screw vessels, the question of steering is of immense importance, and I would respectfully suggest to some of our wealthy and practical members whether a series of experiments on models might not show that the rudder is not the best means of steering that class of vessel. Inasmuch as the screw, representing as it does the

tail of the fish, cannot be attached to a flexible body, as that is, it can therefore *only* be used as a means of progression. But might not the position of the pectoral fins of the fish give a clue to the formation of a steering apparatus which should be more effectual, with less risk of injury, than the present rudder.

I am of opinion that such a series of experiments would demonstrate that nature has not provided those fins in vain.

The *Warrior* now "wears" or turns a half circle in nineteen minutes, and supposing her speed to be fourteen miles an hour, requires a circle whose diameter is nearly three miles to turn round in. This, surely, is evidence enough that something is needed, and something more than the proposed enlargement of the rudder, which, if it gives an increase of power, will as certainly increase the risk of injury to itself, involving, as that does, the probable loss of the vessel.

A few hundreds spent in experiments, where such momentous interests are at stake, could scarcely be called "wasted," and I think it possible that when one or two more striking instances of the inefficiency of the present steering apparatus shall have come before the public, this opinion may meet with more general acceptance.

I am, &c., A. STEWART HARRISON.
133, Upper Thames-street, E.C., Dec. 4th, 1861.

Sir,—Mr. Leigh states that I "deny one fact and do not understand the other." Now his assertion that the helms of the two vessels which came into collision were useless—if in working order, and worked properly—is not correct. No practical seaman will accept it, nor will any evidence on any inquest affect the matter at all. But let that pass.

On the second point, for the joint information of Mr. Leigh and Mr. Reveley, I have, when a very young schoolboy, over and over again repeated the "boat trick," upon which they would so kindly enlighten me. This, however, is not the matter at issue. Mr. Leigh, in his first letter, leads every one to infer that, whatever the velocity of a steamer—8, 10, or 12 knots an hour—his invention would check it instantaneously, and bring the vessel round without her moving an inch forward. This is what I denied before, and still deny. I am quite willing to believe Mr. Leigh's scheme may be of some value as an auxiliary to the rudder, if he can prove that its advantages counterbalance its disadvantages. As he proceeds, I have not the least doubt he will find out what the latter are, and he will come to the conclusion—if he is candid enough to confess it—that the rudder *cannot* be dispensed with.

I am, &c., JAMES KNOX.
Manchester, December 4th, 1861.

MEETINGS FOR THE ENSUING WEEK.

- MON. ...R. Inst. British Architects, 8.
R. Medical, 8½. Mr. Maunder, "On primary Venereal Ulcers; possible sources of error of diagnosis, and the evil consequences of such error."
- TUES. ...Civil Engineers, 8. Annual General Meeting.
Ethnological, 8. Professor Owen, "On the Osteology and Dentition of the Andaman Islanders."
Statistical, 8. Mr. Fred. Hendriks, "On the Vital Statistics of Sweden."
- WED. ...Society of Arts, 8. Mr. F. Crace Calvert, F.R.S., "On the Improvements and Progress in Dyeing and Calico Printing since 1861."
Geological, 8. 1. Professor Morris, V.P.G.S., and Mr. George E. Roberts, "On the Carboniferous Limestone of Farlow and Oulton, Clee Hills, Shropshire." 2. Mr. E. W. Binney, F.R.S., "On some Fossil Plants, showing Structure, from the Lower Coal-measures of Lancashire."
- THURS. ...Antiquaries, 8½.
Chemical, 8. 1. Dr. Bence Jones, "On the simultaneous variations of hippuric and uric acids in healthy human urine." 2. Mr. G. F. Rodwell, "On the solubility of sulphate of lead in hydrochloric and nitric acids."
Linnean, 8. 1. Dr. Hooker, "On *Welwitschia mirabilis*." 2. Mr. Benthams, "On *Inocarpus*." 3. Prof. Oliver, "On *Hamamelis*."
Numismatic, 7.
Royal, 8½.

PATENT LAW AMENDMENT ACT.

APPLICATIONS FOR PATENTS AND PROTECTION ALLOWED.

[From Gazette, November 29th, 1861.]

- Dated 16th November, 1861.
2882. J. Booth, T. W. Chambers, and J. Chambers, Bury, Lancashire—Imp. in looms for weaving.
2884. M. Gibson, St. Andrew's Works, Gallowgate, Newcastle-on-Tyne—Imp. in reaping and mowing machines.
2886. D. Stewart, Newcastle-on-Tyne—Imp. in hydraulic cotton presses "worked by steam."
2888. J. Elise and T. Godfrey, Mansfield, Nottinghamshire—An improved washing apparatus.
Dated 18th November, 1861.
2894. F. C. Paetow, Manchester—Imp. in machinery or apparatus for raising and finishing fabrics. (A com.)
2896. R. A. Brooman, 166, Fleet-street—Imp. in reaping machines. (A com.)
2898. G. Prodon-Bonneton and M. G. Prodon, Thiers, France—Imp. in means or apparatus for rolling metals.
2900. G. Parry, Ebbw-vale Iron Works, Monmouthshire—Imp. in the manufacture of iron and steel.
Dated 19th November, 1861.
2902. J. Hemingway, Robert Town, Yorkshire—Imp. in machinery or apparatus to be used in the working, "winning," or mining of coal, clay, shale, and other minerals or earthy matters.
2908. R. A. Brooman, 166, Fleet-street—Imp. in breech-loading fire-arms. (A com.)
2910. F. L. Stott and M. Tomlinson, Rochdale, Lancashire—Imp. in the construction of vessels or apparatus for supplying lubricating matter to mechanism.
Dated 20th November, 1861.
2912. J. H. Johnson, 47, Lincoln's-inn-fields—Imp. in machinery or apparatus for cutting irregular and curvilinear forms in wood or other similar substances. (A com.)
2916. W. P. Bayliss, The Lloyd's, Madeley, Shropshire—Imps. applicable to buildings in order to facilitate the extinguishing of any conflagration which may happen therein.
2918. L. Thomas, 9, Union-street, Berkeley-square—Imp. in the mode of manufacturing and constructing wrought iron ordnance.

[From Gazette, December 6th, 1861.]

- Dated 29th July, 1861.
1888. F. Tolhausen, 35, Boulevard Bonne Nouvelle, Paris—Imp. in comforters, neck-ties, cravats, and the like articles of garment for the neck and chest. (A com.)
Dated 3rd August, 1861.
1929. G. L. M. Viscount de Ponton d'Amecourt Paris—Imp. in apparatus connected with aerostation.
Dated 19th September, 1861.
2340. W. Clark, 53, Chancery-lane—Imp. in machinery for the manufacture of fishing and other nets. (A com.)
Dated 3rd October, 1861.
2468. J. A. Tannahill, Devon and Cornwall Bank, Truro—An improved apparatus for counting money.
Dated 10th October, 1861.
2531. C. W. Felt, Salem, Essex U.S.—An improved machine for setting, spacing, justifying, and distributing printer's type.
Dated 22nd October, 1861.
2640. H. B. Fox, Liverpool—Imp. applicable to iron and other metallic bedsteads.
Dated 23rd October, 1861.
2646. C. Brison and A. Chavanne, Lyons, France—Imp. in ovens, kilns, or furnaces for manufacturing or other purposes.
Dated 26th October, 1861.
2694. W. Smith, Leek, Staffordshire—Imp. in the preservation of stone, brick, and other such materials used in building, applicable also to the waterproofing of walls.
Dated 29th October, 1861.
2710. R. Gibbon, Royal Brewery, Brentford—Imp. in machinery or apparatus for preparing grain for brewers.
2714. J. Hayward, Everton, Liverpool—Imp. in means or apparatus for raising water or other fluids.
Dated 5th November, 1861.
2804. H. Montucci, 38, Rue du Sentier, Paris—Imp. in apparatus for goffering or embossing stuffs in high relief.
2810. A. B. Berard, 51, Avenue Montaigne, Paris—Imp. in apparatus for separating metals from their ores.
Dated 9th November, 1861.
2816. S. Haguo, Nottingham—Imp. in the manufacture of hoes, adzes, or other similar articles.
Dated 11th November, 1861.
2826. W. Tongue, Chrysell-road, Brixton—Imp. in processes for treating, preparing, and combing certain fibrous materials, and in the machinery or apparatus employed for these purposes.

Dated 12th November, 1861.

2834. W. J. Hay, Southsea—Imp. in protecting iron and wooden ships, caissons, dams, and other wooden or iron structures from decay and from fouling by vegetable and animal matters, and in preparing the materials employed therein.
2835. R. Bellis, Chester—An improved method of laying wood floors.
2837. G. Davies, 1, Serle-street, Lincoln's-inn—Imp. in bleaching cotton and other textile fabrics or materials, and in the apparatus employed in such process. (A com.)
2838. W. Cooke, 26, Spring-gardens, St. Martin's-in-the-Fields—Imp. in the construction of carriages and vehicles, and in the means of ventilating the same, this part of the invention being applicable also to windows generally, and other such openings.
2839. A. V. Newton, 66, Chancery-lane—Imp. in the construction of dinner plates. (A com.)
2841. W. E. Newton, 66, Chancery-lane—Imp. in skates. (A com.)
2842. W. Tongue, Chrysell-road, Brixton—Imp. in the manufacture of printed yarns and in the application of certain fibrous materials to the manufacture of certain descriptions of yarns and threads.
2843. J. H. Johnson, 47, Lincoln's-inn-Fields—Imp. in the construction of steam or other vapour and water or other liquid tight joints. (A com.)
2845. M. Henry, 84, Fleet-street—An imp. in, and composition for treating iron and steel, and articles manufactured thereof. (A com.)

Dated 13th November, 1861.

2846. T. L. Holt, Brook House, Brentford—A new method of making paper from the cochlearia armoracia or horse radish.
2847. T. B. Collingwood and A. Butterworth, Rochdale—Imp. in throstle and doubling frames for spinning and doubling fibrous materials.
2848. J. Hodgkinson and D. Greenhalgh, Bolton—Imp. in machinery or apparatus for preparing cotton and cotton-waste, or other fibrous materials to be spun.
2849. W. H. Hammersley, Leek, Staffordshire—Imp. in machinery or apparatus for stretching, glossing, and finishing silk. (A com.)
2851. E. C. Kemp, Avon-place, Pershore-road, Birmingham—Imp. in gas lamps, glasses, and other fittings.
2853. L. Rolland, 306, Quai Jemmapes, Paris—An improved spring door shutter with a moveable lever.
2857. C. E. Wilson, Monkwell-street—A new article of female wearing apparel to be worn on the leg.
2863. G. T. Bousfield, Loughborough-park, Brixton—Imp. in the manufacture of soap. (A com.)
2865. H. R. Fricker, 106, Leman-street, Whitechapel, and J. Manley, Fairmacle-street, Truro, Cornwall—Imp. in apparatus for facilitating the cleansing of sewer and other water courses or ways.

Dated 14th November, 1861.

2867. G. Bridge, Bollington, near Macclesfield—Imp. in machinery or apparatus for preparing cotton and other fibrous materials to be spun.
2869. M. Wiggell, Topsham, Devonshire—Imp. in machinery or apparatus to be used in moulding and casting twisted nails, spiral fluted nails, bolts, and screws, for sheathing vessels, ship building, building, and other purposes.
2871. F. R. Hughes, Borrowstounness, and T. Richardson, Newcastle-on-Tyne—Imp. in treating certain natural saline compounds to fit them for agricultural use, and in order to obtain potash and other salts.

Dated 15th November, 1861.

2875. J. Nixon, Cardiff—Imp. in apparatus for ventilating coal or other mines or other underground excavations.
2877. E. Loomes, Whittlesey, Cambridgeshire—Improved machinery for moulding bricks, tiles, and other like articles.
2879. L. A. Soupart, Brussels—Imp. in the mode of preparing and subsequently tanning hides or skins.

Dated 16th November, 1861.

2883. J. C. Goodall, 12, Great College-street, Camden-town, and J. Beale, East Greenwich—Imp. in machinery for folding envelopes.
2887. R. T. Worton, Newberry-place, Kentish-town—Imp. in pianofortes.

Dated 18th November, 1861.

2891. J. Hawkins, Lisle-street—Certain imp. in bits for riding and driving.
2895. M. D. Rogers, 2, Bow-lane Cottages, Saint Leonards-road, Bromley—An improved chain cable stopper or controller.

Dated 19th November, 1861.

2901. L. Smith and M. Smith, Heywood, Lancashire—Imp. in raising liquids, and in apparatus connected therewith, parts of which are applicable to improving the quality of fermented liquors.
2903. T. Redwood, 19, Montague-street, Russell-square—Imp. in the manufacture of starch and of a vegetable sizing powder.
2905. J. Taylor and T. H. Hepworth, Hyde, Chester—Imp. in equilibrium lubricators for steam cylinders, valve boxes, and other similar purposes.
2907. B. D. Godfrey, Milford, U.S.—An improved boot or shoe with a wooden shank part and a flexible fore part to the sole.

Dated 20th November, 1861.

2911. G. Gwilliam, the Savoy, Strand—Imp. in the manufacture or production of plate glass.

2914. F. Johnson, 12, North-street, Westminster—Imp. in ground or earth screws.

2915. J. C. Croxford, 3, Chapel-row, Exmouth-street, Clerkenwell—An improved mode of fastening doors and for other similar purposes.

2919. E. Peyton and W. Batho, Birmingham—Imp. in the moulds or chills employed in casting corner blocks, dovetail grooves, and other parts of metal bedsteads and other like articles in frames for carrying such moulds, and in tubes for the pillars of bedsteads and other like articles.

2920. J. H. Johnson, 47, Lincoln's-inn-Fields—Imp. in the treatment of zinc ores, and in the apparatus employed therein, which improvements are also applicable to the manufacture of phosphorus. (A com.)

Dated 21st November, 1861.

2922. J. Parkinson and C. H. Minchin, Manchester—Imp. in the "Davy" or other safety lamps for miners.

2926. J. Stubbs, Winsford, Chester—Imp. in apparatus for heating and evaporating brine in the manufacture of salt.

2928. W. E. Newton, 66, Chancery-lane—Imp. in rotary engines. (A com.)

Dated 22nd November, 1861.

2930. W. Hirst, Halifax—Imp. in the manufacture of paste, which is also applicable for sizing purposes.

2932. W. Ambler, Keighley, Yorkshire—Imp. in the manufacture of loom pickers.

2934. G. J. Farmer, Birmingham—Imp. in machinery or apparatus for polishing shoe heels, toe plates, and other articles.

2936. T. W. Davenport and S. Cole, Balsall-Heath, Worcestershire—Imp. in apparatus or machinery to be employed in the manufacture of ornamental and useful articles in papier-mache.

2938. E. Peyton and W. F. Batho, Birmingham—Imp. in laths for supporting bedding and cushions in bedsteads, couches, sofas, and seats.

Dated 23rd November, 1861.

2944. J. Weems, Johnstone, Renfrew, N.B.—Imp. in the manufacture of metallic tubes, and in coating or plating metals.

PATENTS SEALED.

[From Gazette, December 6th, 1861.]

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|---------------------|-------------------------|
| December 6th. | 1477. M. Mason. |
| 1455. J. Whines. | 1480. J. Langdale, jun. |
| 1464. J. Martin. | 1488. C. Stevens. |
| 1472. R. Armstrong. | 1520. J. Illingworth. |
| 1473. A. Brown. | 1762. C. Maschwitz. |

[From Gazette, December 10th, 1861.]

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| December 10th. | 1549. W. Clark. |
| 1493. E. T. Hughes. | 1562. A. W. Gibson. |
| 1495. R. W. Smith and D. Scat- | 1570. J. Dixon. |
| tergood. | 1574. W. Clark. |
| 1499. W. H. Walker. | 1579. G. T. Bousfield. |
| 1500. J. A. Dunacey. | 1580. J. F. Williams. |
| 1504. J. Durrant & N. A. Harris. | 1581. W. J. Harris. |
| 1505. H. Mason. | 1604. A. L. Le Harivel. |
| 1510. J. Napier. | 1621. W. Clark. |
| 1511. D. Walmsley & J. Rostron. | 1633. M. A. F. Mennons. |
| 1514. C. Swan. | 1640. J. Cowan. |
| 1521. F. Gregory. | 1671. J. H. Johnson. |
| 1522. S. Cook and W. H. Hacking. | 1757. W. B. Adams. |
| 1523. The Hon. C. Duncombe. | 1778. A. Topham, J. Topham, |
| 1524. B. Blackburn. | and J. Topham. |
| 1525. T. M. Downing. | 1800. Sir W. O. Brooke. |
| 1526. W. Baylis. | 1811. J. H. Johnson. |
| 1528. J. Summerscales. | 1884. C. E. Amos and J. Francis. |
| 1523. T. W. Wedlake. | 1918. J. Wright. |
| 1533. G. Leach. | 2613. J. Marshall. |
| 1535. R. W. Pitfield. | 2617. W. C. Cambridge. |
| 1547. T. Mellodew, C. W. Kes- | |
| selmeyer, and J. M. Wor- | |
| rall. | |

PATENTS ON WHICH THE STAMP DUTY OF £50 HAS BEEN PAID.

[From Gazette, December 6th, 1861.]

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| December 2nd. | December 4th. |
| 2760. G. Spiller. | 2808. J. Ferrabee and F. H. England. |

[From Gazette, December 10th, 1861.]

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| December 6th. | 2829. H. Wilson. |
| 2794. R. A. Brooman. | 2848. W. E. Wiley. |
| 2815. A. Lamb & W. A. Summers. | 2879. W. Morgan. |
| December 11th. | 14. M. Wiggell. |
| 2813. M. Henry. | |

PATENT ON WHICH THE STAMP DUTY OF £100 HAS BEEN PAID.

[From Gazette, December 10th, 1861.]

- December 6th.
2702. J. Hunt.